THE RELATIONSHIP BETWEEN STOCK PRICES AND BUSINESS CONDITIONS

by

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INTRODUCTION

Based on Standard and Poor's Composite Long-Term Stock Price Index, eighteen stock price cycles (trough to trough) occurred in the United States during the seventy-eight year period 1871 - 1948.[1] On the other hand, twenty-five business cycles occurred during the period 1857 - 1964. The number of business cycles has been determined by Burns and Mitchell[2] between 1857 and 1938 and by Graham, Dodd, and Cottle[3] between 1939 and 1962. Dates, duration and amplitude of the stock prices and business cycles are presented in Tables 1 and 2 of the Appendix.

A study of Chart 1 on the next page suggests that some correlation exists between stock prices and business activity, but that the correlation often breaks down during short periods of time. For example, in the recessions of 1948-49, 1953-54, 1957-58 and 1960-61 the decline in business activity was not accompanied by a decline in stock prices of corresponding severity. But over the whole period from 1949 to 1961, the correlation appears to be fairly close. Measured from the low of 1949 to the high of 1961, stock prices rose 434 percent. During the same period, the Gross National

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[1] C. S. Cottle and W. T. Whitman, Investment Timing: The Formula Plan Approach, p. 3.

[2] A. F. Burns and W. C. Mitchell, Measuring Business Cycles, (New York: National Bureau of Economic Research, 1947), p. 78.

[3] B. Graham, D. L. Dodd and S. Cottle, Security Analysis, p. 23.

Source: Cottle, Charles S. and Whitman, W. T. Investment Timing: The Formula Plan Approach. New York: McGraw-Hill Book Company, Inc., 1953, p. 51.

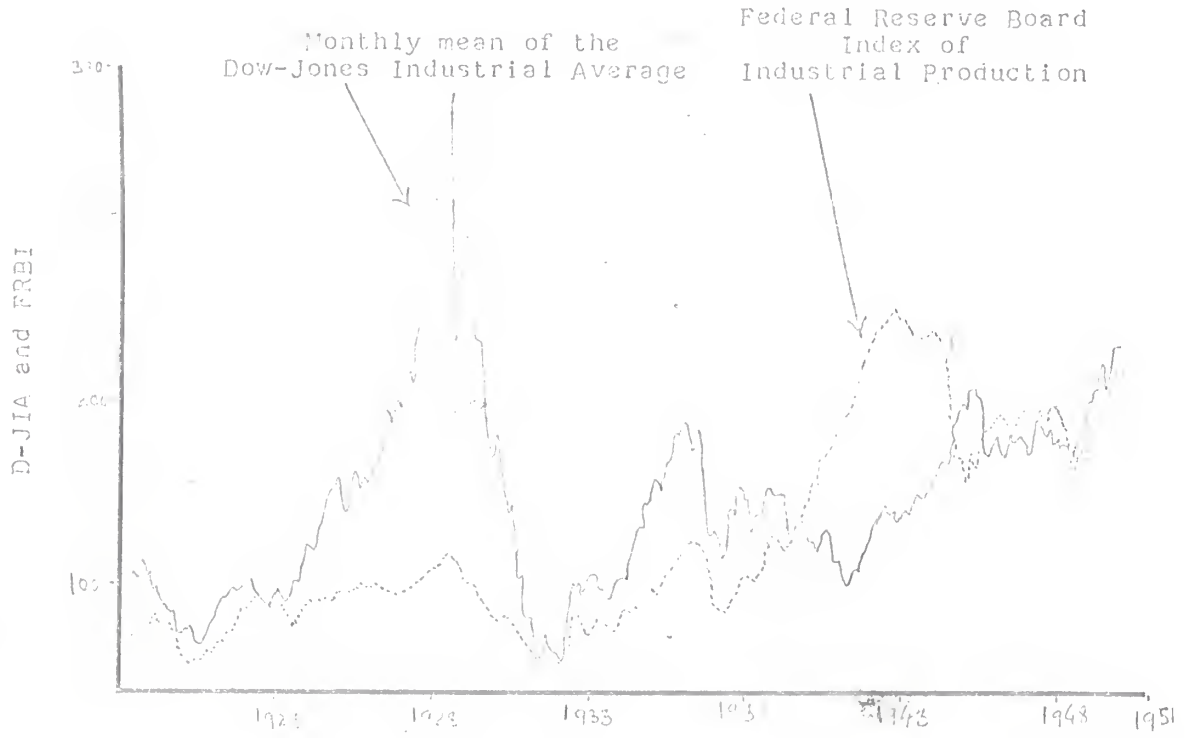

Chart 1

Monthly Fluctuations of the Dow-Jones Industrial Average and the Federal Reserve Board Index of Industrial Production (FRBI plotted with one-month lag), 1919-1950.

Product, hereafter referred to as the GNP, increased from $258 billion to $517.7 billion, corporate net income before taxes rose from $35 billion to $44 billion and corporate net income after taxes increased from $17 billion to $24 billion.

The National Bureau of Economic Research sponsored several studies concerning the behavior of stock prices over time. However, the studies did not investigate either theoretically or empirically such questions as how stock prices are determined, what factors are important in influencing stock prices, what inter-relationship exists between stock prices and GNP and how these factors exercies their influence in the short and long run.

This report will attempt to answer the following questions:

1. Do business conditions affect stock prices over the long run?
2. If the answer to the first question is in the affirmative, what is the nature of this effect?

Business conditions will be operationally defined as GNP. Standard and Poor's Long-Term Stock Price Index will be used as the measure of stock prices. The Index is available for a longer period of time (1871 to 1965) than any other stock price index.

The relationship between stock prices and GNP will be examined both theoretically and imperically. The theoretical relationship will be established by using earnings as a

connecting link. An attempt will be made to show that business conditions affect earnings and earnings affect stock prices.

The relationship between GNP and stock prices will be tested empirically. First, the correlation will be computed between ten-year averages of GNP and ten-year averages of Standard and Poor's Long-Term Industrial Index for the period 1869 to 1958. Second, a linear regression equation will be computed from the ten-year averages of GNP and Standard and Poor's Long-Term Stock Price Index, with the latter used as the dependent variable. The purpose of this equation will be to measure the influence of business conditions on stock prices. Third, the reliability of the regression equation in measuring the influences of business conditions on annual stock prices will be tested. The test will be conducted by plotting the yearly data of GNP and stock prices for the period 1926 to 1955 against the regression line. The closer the fit, the more reliable will be the estimate of influence of business conditions on stock prices.

REVIEW OF LITERATURE

The relationship between business conditions and stock prices has not been fully explored, although a considerable amount of literature about the problem is available. Business cycles have been a favorite subject for economists, and a great amount of work has been done in the area. The best empirical study of business cycles has been made by A. F. Burns and W. C. Mitchell.[1] The two authors tested five hundred monthly and quarterly economic series of different periods and finally selected seventy-one of these series on the basis of their performance as reliable indicators of business conditions. Stock prices were selected as one of these series. The problems connected with secular, seasonal and random movements of the economic series, dating specific cycles, basic measures for cyclical behavior, adjustments for seasonal fluctuations, and cyclical behavior of different time series were considered.

The works of L. M. Ayres[2] and many others are along the same line. Closer to the subject of this paper are five publications of the National Bureau of Economic Research

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[1] A. F. Burns and W. C. Mitchell, op. cit., p. 1.

[2] L. Ayres, Turning Points in Business Cycles, (New York: The Macmillan Company, 1939).

written by G. H. Moore,[1] David Durand,[2] Thor Hultgren,[3] and Julius Shiskin.[4]

Mr. Durand attempted "to measure the relative importance of various factors that affect the market price of bank stocks . . . More specifically . . . to investigate the factors affecting the ratio of market price to book value . . .[5] He started with the assumption that three primary factors--namely, dividends, earnings, and book value affect bank stock prices. The approach was quantitatively oriented. His most interesting conclusions were (1) the influence exercised by various factors on bank stock prices vary substantially among banks in different locations, (2) only two primary factors--dividends and earnings--seem to play a systematic and easily demonstrable role in determining stock prices.

Thor Hultgren attempted to determine the relationship between corporate profits and business conditions. A few important findings were: (1) the number of companies with

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[1a] G. H. Moore, Statistical Indicators of Revivals and Recessions, Occasional Paper 31, NBER, 1950.

[1b] G. H. Moore, Measuring Recession, Occasional Paper 61, NBER, 1958.

[2] David Durand, The Bank Stock Prices and Bank Capital Problem, Occasional Paper 54, NBER.

[3] Thor Hultgren, Cyclical Diversities in the Fortunes of Industrial Corporations, Occasional Paper 32, NBER.

[4] Julius Shiskin, Signals of Recession and Recovery, Occasional Paper 77, NBER, 1961.

[5] David Durand, op. cit., p. 1.

rising profits declines in late business expansion and increases in late contraction, (2) turning points in profits of individual companies cluster about turning points in business, (3) there is limited predictive value of profits for forecasting business cycles, and (4) there are always some exceptions. He states that,

> The quarter by quarter data indicate that in the quarter with fewest rises during the great 1929-37 depression, 26 percent of the corporations had rising profits. In the quarter of 1920's most favorable to profits, 23 percent had diminishing earnings . . . In every quarter of the 1920's the profits of at least 16 percent of the companies were contracting or at a trough. In every quarter of the 1930's, the profits of at least 12 percent were expanding or at a peak.[1]

The purpose of G. H. Moore's work published in the NBER's[2] Occasional Paper 61 was similar to that of Julius Shiskin's work published in the NBER's Occasional Paper 77. Both dealt with the economic series that are reliable in forecasting business cycles although the total number of economic series examined was different in the two works. In both cases, stock prices were considered one of the reliable economic series.

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[1]Thor Hultgren, op. cit., p. 11.

[2]NBER means National Bureau of Economic Research.

Mathematical techniques have been extensively used in the study of business cycles. Some authors[1] have tried to determine quantitatively the relative importance of several factors that they considered important in determining stock prices.

J. K. Galbraith[2] and Thomas Wilson[3] have done extensive research in attempting to explain the high prices of stocks during the period 1924-1929. Galbraith's objective was to find the reasons for the stock market crash in 1929, the great depression that followed, and the latter's unprecedented

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[1a] J. B. Williams, The Theory of Investment, (Cambridge: 1938).

[1b] M. J. Gordon, "Dividends, Earnings and Stock Prices," The Review of Economics and Statistics, May 1959, pp. 99-106.

[1c] J. Tinbergen, "The Method of Share-price Formation," Review of Economics and Statistics, Nov. 1939, pp. 153-160.

[1d] Paul G. Darling, "A Surrogative Measure of Business Confidence and its Relation to Stock Prices," Journal of Finance VIII, September 1953, pp. 183-197.

[1e] Edwin Kuh and John R. Meyer, "Correlation and Regression Estimates when the Dada are Ratios," Econometrica, Oct. 1955, pp. 400-416.

[1f] T. W. Davis, The Analysis of Economic Time Series, (Bloomington, Indiana: Principia Press, 1941), Chapt. II, pp. 499-544.

[2] J. Galbraith, The Great Crash 1929, (Boston: Houghton Mifflin Company, 1955).

[3] Thomas Wilson, Fluctuations in Income and Employment with Special Reference to Recent American Experience and Post War Prospects, (Third Edition; New York: Pitman Publishing Corporation, 1948).

duration and amplitude. His work is a satire on the ignorant but fanatical politicians, scholastic but misguided economists, and the enterprising but unscrupulous business community. The investigation, though devoid of economic jargon, is highly penetrating.

Wilson tested the fundamental Keynsian postulates empirically under the conditions that existed between World War I and II. The factual economic information in the book is useful in order to explain the fluctuations in stock prices.

A few authors have dealt more directly with the subject of this study. Important among these are J. F. Weston,[1] J. C. Clendenin and Maurice Von Cleave,[2] Ezra Solomon,[3] F. Modigliani and M. H. Miller,[4] Daniel Seligman and

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[1a]J. F. Weston, "Some Theoretical Aspects of the Construction of Formula Timing Plans," Journal of Business, University of Chicago, Oct. 1949.

[1b]J. F. Weston, "The Stock Market in Perspective," Harvard Business Review, March-April 1956, pp. 71-80.

[2]J. C. Clendenin and Maurice VonCleave, "Growth and Common Stock Values," Journal of Business, July 1955, pp. 216-217.

[3]Ezra Solomon, "The Economic Growth and Common Stock Values," Journal of Business, University of Chicago, July 1955, pp. 216-217.

[4]Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," The Management of Corporate Capital, edited by Ezra Solomon, p. 154.

T. A. Wise,[1] D. M. Lamberton,[2] and G. S. Cottle and W. T. Whitman.[3] The works of these authors provide the frontier of knowledge of the relationship between business conditions and stock prices. Some of them have discussed such topics as the relationship between earnings and stock-prices and the relationship between GNP and earnings. Trend lines were fitted by Cottle and White by the least-square method to show the secular rising trend of stock prices, earnings and dividends. The rate of increase in the trend of all three series was found to be approximately the same.

The present study will integrate various relationships examined by the above authors for different purposes to provide a theoretical structure of the relationship between stock prices and business conditions. Thus, the present study will provide an inter-related, theoretical and analytical basis for the subject. Up to the present, only fragmentory work has been done in this area. The correlation between stock prices and GNP and a regression equation including the same variables will be computed on a long-term basis for the purpose of examining emperically the content of

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[1]Daniel Seligman and T. A. Wise, "New Forces in Stock Market," Fortune, Feb. 1964, p. 92.

[2]D. M. Lamberton, "Economic Growth and Stock Prices - The Australian Experience," bibliog. f. Journal of Business, June 1956.

[3]C. S. Cottle and W. T. Whitman, op. cit.

the theoretical structure. This computed relationship will be tested on an ex post basis for single years during a period. Thus, the present study will attempt to develop a theoretical structure supported by empirical evidence.

ANALYSIS OF THE PROBLEM

The examination of the relationship between stock prices and GNP will be approached on a long-term basis. For purposes of this study, long-term means: (1) the period used for studying the relationship will be long (1869 to 1958) and (2) the figures for GNP and stock prices that will be used to compute the correlation and the regression equation are ten-year averages of annual data.

The theoretical relationship between stock prices and business activity will be discussed first. Then the conclusions will be tested empirically. In the latter part of the chapter, the predictive power of the relationship between stock prices and business activity will be tested on an ex-post basis. The period 1920 to 1955 will be used for this purpose because a depression, an expansion (with several short recessions) and one world war occurred during this 36-year time span. No other period had such widely-varying conditions.

The problem will be approached from the point of view of the economy as a whole, although the examples and behavior of individual firms may be cited to illustrate particular points.

The procedure followed in the analysis will be to examine three relationships:

1. business conditions and earnings;
2. earnings and stock prices;

3. stock prices and business conditions.

It may appear that the first two relationships are not relevent to the study. However, understanding these two relationships is essential for understanding the third.

Relationship Between Earnings and GNP

Theoretical Approach

An economy has a baffling and frustrating complexity of relationships which are not generally understood in totality. There are innumerable economic variables, many of which change simultaneously. A change in one variable affects many other variables; some are affected directly and some indirectly. In many cases there is an intercorrelation between these variables. Changes in economic variables do not always follow a systematic and predictable pattern. Among all the variables, the most important is man, whose behavior is not always rational. This fact frustrates any attempt to give the social sciences the predictability and precision that the physical sciences possess. In such a situation, it is not possible to determine either the channel or the amount of influence of all factors on one another. Thus, an examination of a causal relationship between two variables in the economy usually will not give precise results. The influence of many factors which are not likely to be very important must be ignored.

The above problems exist in studying the relationship between GNP and stock prices. GNP is composed of various elements such as wages, earnings and rent. Among all components of GNP earnings alone has a strong direct influence on stock prices. Other components of GNP may also affect stock prices, but it appears that their direct influence is so insignificant over the long run that they can be excluded for the purposes of the present study.

A larger GNP in period X in comparison to period X-1 means a larger total sales and output. A larger sales in period X in comparison to period X-1 means a larger aggregate profit in period X (in comparison to period X-1) if the margin of profit remains constant or becomes greater. Theoretically, the margin of profit should not decline because fixed cost per unit of output will decline with an increase in production if there is idle capacity in the economy. In the United States, a significant amount of idle capacity will not be an unrealistic assumption in normal conditions. Thus, a reduction in per-unit fixed cost (which means per-unit margin of profit is larger) can be expected with an increase in production.

There is a likelihood of an increase in per-unit variable cost because a larger production will mean a larger demand for some of the variable factors of production. And larger demand of these variable goods and services may push their prices upwards. The increase in their prices will be

reflected in an increase in per-unit variable cost which could tend to reduce per-unit margin of profit. However, the increase in per-unit variable cost may not be so great as to offset the decrease in per-unit fixed cost because the increase in demand for variable goods and services may not be sufficient in the short run to push their prices very high. Even if the increase in per unit variable cost is large enough to completely offset the decrease in per-unit fixed cost, the margin of profit per unit of output will not decline. Thus, a larger sales ordinarily means a larger profit because margin of profit is not likely to fall.

Empirical Evidence of this Relationship Through Secondary Sources

Empirical evidence corroborates conclusively the theoretical relationship between GNP and earnings. Mr. Thor Hultgren in his empirical investigation about this relationship concludes: "Net earnings of all corporations combined rise in a business expansion and fall in a contraction. But not every corporation participates at every stage in these broad swings."[1] Increases in aggregate corporate profits during periods of business expansion can be observed in Charts 2 and 3 and Table 1, pages 16, 17, and 18 respectively. GNP and earnings have increased over time despite great temporary fluctuations and have usually fluctuated in

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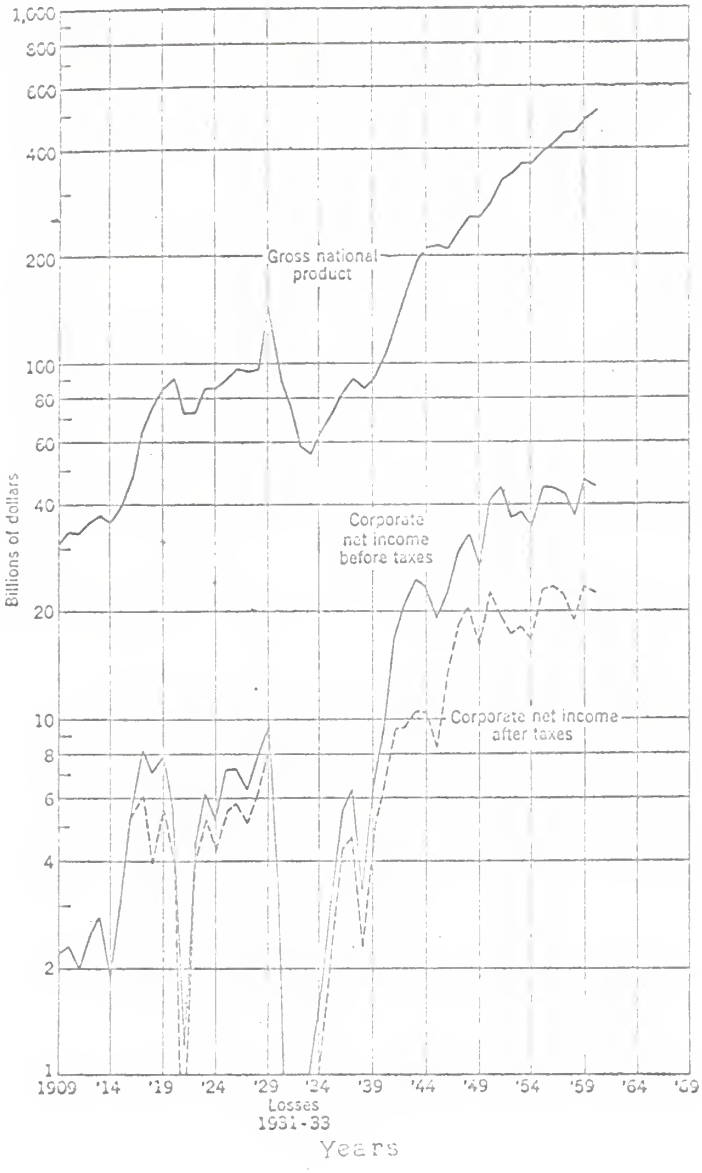
[1]Thor Hultgren, op. cit., p. 1.

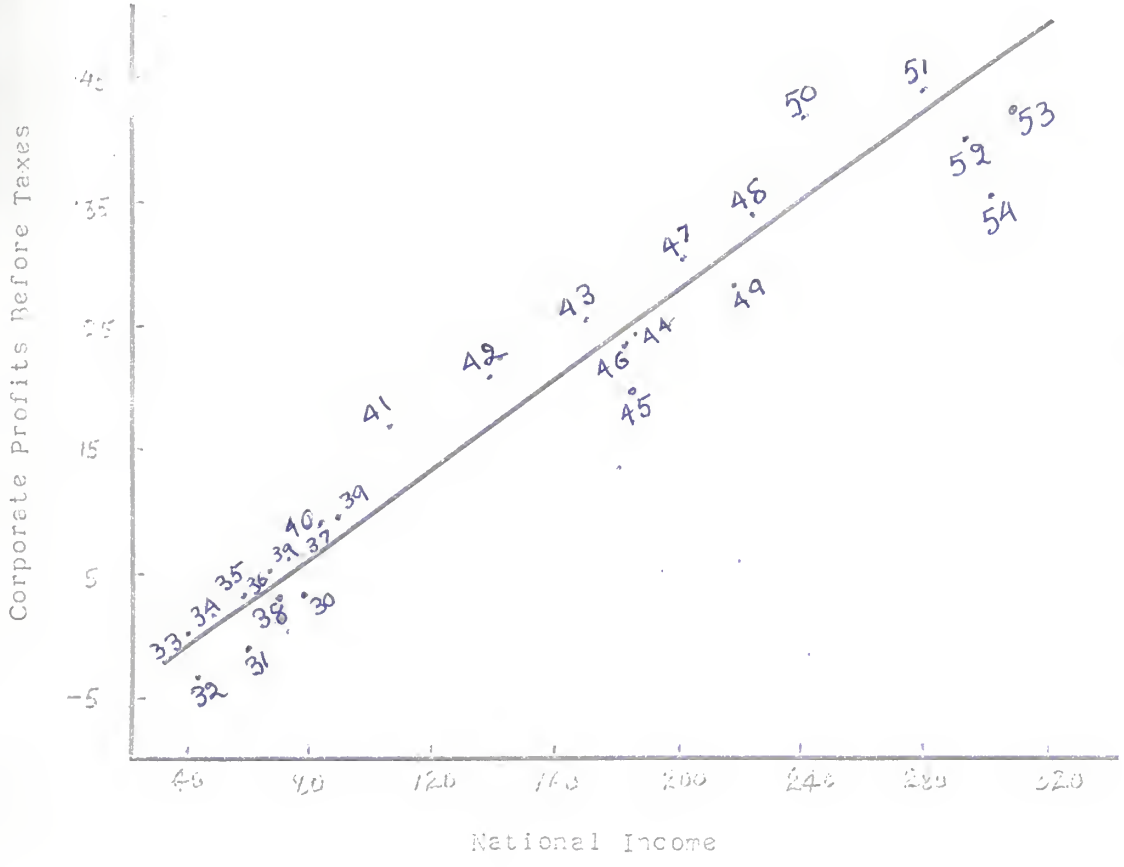
Chart 2

Gross National Product and Corporate Net Income before and after Taxes, 1909–1960.



Source: Graham, B., Dodd, D. L., and Cottle, C. S. Security Analysis Principles and Technique. 4th ed. New York: McGraw-Hill Book Company, Inc.

Chart 3



Source: Weston, J. F. "The Stock-Market in Perspective," Harvard Business Review, March-April, 1956, pp. 71-80.

Table 1[1]

(Money in millions of dollars)

Year	GNP (billion dollars)	CORPORATE Profits for all industries (loss)	DIVIDENDS	GNP in 1929 prices
1957	440.3	47,601	13,468	230.8
1956	419.2	36,468	11,832	212.6
1955	397.5	39,582	11,533	215.3
1954	363.1	38,507	11,196	206.7
1953	356.4	43,495	11,219	199.9
1952	347.0	42,535	11,471	187.1
1951	329.0	28,130	9,464	171.1
1950	284.6	34,248	9,305	174.4
1949	258.1	31,207	8,285	165.6
1948	259.4	25,025	7,378	166.8
1947	234.3	21,220	6,009	180.9
1946	210.7	26,454	5,957	183.6
1945	213.6	27,933	5,628	170.2
1944	211.4	23,280	5,512	154.7
1943	192.5	16,592	6,556	138.7
1942	159.1	9,472	7,236	121.0
1941	125.8	7,236	5,639	111.0
1940	100.6	4,144	4,834	103.2
1939	91.1	7,777	7,281	109.1
1938	85.2	7,618	7,163	100.9
1937	90.8	5,500	5,896	91.4
1936	82.7	3,037	4,788	80.8
1935	72.5	(639)	3,091	74.2
1934	65.0	(3,511)	3,854	76.4
1933	56.0	(487)	6,092	89.5
1932	58.5	Data not available prior to 1932		
1931	76.1			
1930	91.1			
1929	104.4			
1928	98.2			
Data not available prior to 1928				

[1]Source: Historical Statistics of the United States Colonial times to 1957.

the same direction. During the period 1926 to 1957, only the years 1938, 1939, 1946, 1950, 1953, 1955 and 1957 are exceptions. So far as the period as a whole is concerned there is a remarkably good positive correlation between the two.

Corporate earnings during the period 1909 to 1960 were 5.3 percent of GNP. If this period is divided into two parts, i.e., from 1909 to 1929 (the period preceding the great depression) and from 1935 to 1960 (the period following the great depression), with the great depression period excluded, some conclusions can be drawn that will prove the assertion that the margin of profit need not go down as GNP increases. These two periods, despite many structural and institutional changes will have many similar factors such as a world war, inflation, prosperity, relative stability and recession. For the first twenty-one years (i.e. from 1909 to 1929) corporate profits averaged 6.1 percent of GNP. For the period 1935 to 1960, they average 5.5 percent. In the last six years of the period, i.e. from 1955 to 1960, they declined to 5 percent. This gives an impression that corporate profits as a percentage of GNP are declining. However, a little deeper probe will show a different situation. Earnings before taxes but after adjustment for inventory profits and losses have had a remarkably constant relationship with GNP. Thus, when the margin of profit (after

adjustment for inventory losses and gains) remains the same, a higher GNP means a higher earnings.

In the case of an individual corporation, Mr. Hultgren shows through the analysis of quarterly data that,

> . . . in the quarter with fewest rises during the great 1929-37 depression, 26 percent of corporations had rising profits. In the quarter of the 1920's most favorable to profits, 23 percent had diminishing earnings . . . In every quarter of the 1920's the profits of at least 16 percent of the companies were contracting or at a trough. In every quarter of the 1930's the profits of at least 12 percent were expanding or at a peak.[1]

It is important to note that when economic activity begins to improve, the number of companies with improving profits is rising and continues to rise during the earlier stages of business expansion. Long before the decline in economic activity on the whole, however, the number of companies with improving profits begins to diminish. The fall in number continues to the end of the expansion in business and on into the earlier stages of business contraction. Long before economic activity revives, however, the number of companies with growing profits again begins to increase.

Thus, barring the behavior of individual firms, there appears to be a direct relationship between GNP and earnings. Both tend to vary in the same direction.

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[1]Thor Hultgren, op. cit., p. 11.

Relationship Between Stock Prices and Earnings

Theoretical Approach

The price of a stock in a competitive market is determined like the price of any other commodity, i.e., by its demand and supply. As the purpose here is to show the relationship between the stock prices and earnings, supply is assumed to be constant. The demand of a stock is determined by the expected rate of return. A buyer of stock anticipates a return either through dividends or appreciation of stock prices or both.

At times investments are highly speculative and bear a considerable amount of risk. The anticipated rate of return will have to be adjusted for the risk before the influence of the rate of return on stock prices is determined. If this is not done, the influence of the two variables, i.e., the rate of return and the amount of risk, cannot be separated as both influence stock price. All factors should remain constant, while one changes. But the trouble is that before the risk component is removed from the rate of return, it must be quantitatively determined. The measurement of risk raises a number of problems that are difficult to overcome, especially the element of subjectivity. The same situation may appear more risky for one person in comparison to another. Some persons enjoy gambling for several hundred dollars while others fear to bet a few cents.

The same element of subjectivity is involved in anticipating a rate of return from a particular investment project. Some persons are more optimistic than others. A particular investment may make a few persons anticipate a higher rate of return than others. Thus the element of subjectivity affects both the expected rate of return and the risk when they have to be quantitatively determined. And unless they are quantitatively determined, one cannot be precise about the degree of influence of rate of return on stock price. Still, it is quite reasonable to say that, assuming supply is constant, the price of a stock that a buyer is prepared to buy is determined by its expected rate of return. The higher the rate of return anticipated, the higher will be the stock price.

Theoretically, it is not possible to determine the relative influence of dividends and retained earnings on stock prices. But several studies have been made to determine emperically the relative influence of the two on the stock prices. Although it is not necessary for this study to determine precisely the relative influence of dividends and retained earnings on stock prices, yet the determination of the relative importance of the two will give us some more insight into the problem of discerning the effect of earnings on stock prices.

Empirical Evidence

There are many empirical works which show the influence of earnings on stock prices. The influence of earnings on stock prices has been shown through (1) dividends, (2) retained earnings, and/or (3) total earnings. Mr Durand has made ". . . a series of estimates of the relative importance of dividends and earnings as determinants of market price in relation to book value."[1] His conclusions follow:

> Thus in group 2, 4, and 5, the weight for dividends exceeds the weights for book value and for earnings in all years, which implies that dividends ranks first among the three factors in its effect on the market prices of most of the stocks in these groups. But in group 1, consisting of New York City bank stocks, first place goes to book value, whose weight exceeds that for dividends in all years and that for earnings in all years but one.[2]

Other interesting findings were, "But it is certainly true that none of these factors [risk, asset, ratios, reserves, stability of earnings, etc.] exerted systamatic effects that were clearly discernible with the statistical methods used."[3] The most interesting conclusion of all was "The study was unable to find a direct relationship between bank stock prices and obvious measures of growth, such as

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[1]David Durand, op. cit., p. 5.

[2]Ibid., p. 16.

[3]Ibid., p. 18.

the rate of increase in bank earnings."[1] He considered growth and retained earnings as the same thing.

Although Mr. Durand did not find any influence of retained earnings on stock prices, it is difficult to accept his findings as conclusive. The common stock of Superior Oil in 1957 sold at $2000 per share with $44.71 in earnings and without paying a dividend. In 1960, it sold at $2165, paying $7.50 out of earnings of $51.19. Texas Instruments sold at $5 in 1954 and at $256 in 1959 without ever paying dividends. Polaroid sold at $261 in 1960 with a dividend rate of only five cents quarterly and earnings of $3. Some of the recognised growth companies supplement a low cash dividend by more or less period stock dividends, e.g. IBM. Many companies that have not been growing have maintained their prices through paying dividends. Railroads are a good example. Thus it appears that the companies lacking growth could maintain their prices by giving dividends while companies that are dynamic and expanding can increase their stock prices through retaining earnings and maintaining the growth.

The Cowles Commission noted after observing the performance of common stock prices over a period of sixty-eight years (from 1871 to 1938) that all stocks on the average advanced in price at the rate of 1.8 percent while the

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[1] Ibid., p. 5.

amount of earnings retained by corporations increased by 2.5 percent. "This means that every $2.50 of earnings retained by a corporation has, on the average, been associated with an increase of $1.80 in the value of its stock."[1] The Commission suggested "undervaluation" as a possible reason for this loss to the stockholders.

Mr. Hugh Pastoriza[2] examined 14 utility companies and concluded that out of the total increase in stock prices, 17 to 31 percent could be accounted by undistributed earnings. On an average, 25 percent of the increase in stock prices is explained by undistributed earnings. This finding has been supported by Harold H. Young.[3]

It is not intended here to discuss in detail the channel of influence of earnings on stock prices. The influence might be through either dividends or retained earnings; or earnings in toto may have a more distinct effect on stock prices. For the purposes of the present study, the precise distinction among the influences of the dividends, retained earnings and total earnings on stock prices is relatively unimportant. Dividends and retained earnings themselves are

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[1]Cowles Commission for Research in Economics, Common-Stock Indexes, (Bloomington, Indiana: Principia Press, Inc.), p. 42.

[2]Hugh Pastoriza, "Valuing Utility Earnings Distributed and Retained," Analyst Journal, July 1945.

[3]Harold H. Young, "Factors Influencing Utility Price Earnings Ratios," Analyst Journal, January 1945.

determined by earnings in the long run. Dividends cannot be maintained for long in the absence of earnings. Retained earnings are determined by earnings and dividends. For our purposes, the relative influence of dividends, retained earnings and total earnings is of secondary importance so long as the total influence of all three are considerable on stock prices. It is quite justifiable to say that earnings influence stock prices.

Molodovsky[1] fitted trend lines by the least squares method for stock prices and earnings and found that both have an upward slope. Stock prices had an annual rate of growth of 1.99 percent and earnings an annual rate of growth of 2.13 percent. The Cowles Commission Study has suggested "that the discrepancy[2] was due to undervaluation of common stocks in the market during 1871-1938." However, undervaluation probably was not the only reason for this discrepancy between the rates of increase in stock prices and earnings because Cottle and Whitman found 3.2 percent annual rate of increase in stock prices and 2.2 percent in earnings for the period 1889-1949 by fitting trend lines. (See Chart 4, page 27). Thus in the case of Cottle and White,

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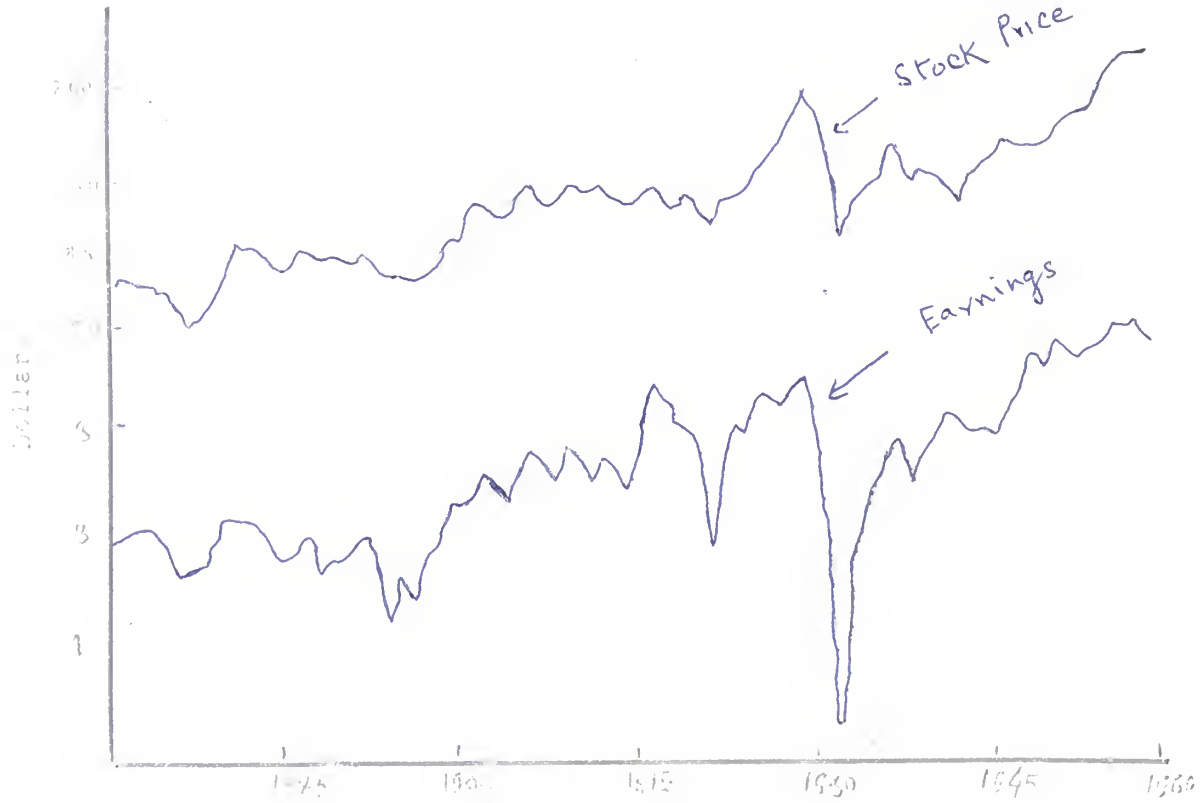
[1]N. Molodovsky, "Valuation of Common Stock," Readings in Financial Analysis and Investment Management, edited by E. M. Lerner.

[2]The word discrepancy means here the discrepancy between the level stock prices ought to have reached on the basis of reinvested earnings and actual stock prices.

Chart 4

Relationship between Stock Prices and Earnings



Source: Lerner, E. M. (ed.). Readings in Financial Analysis and Investment. Homewood, Illinois: (A Publication of the Institute of Chartered Financial Analysts, Inc.) Richard D. Irwin, Inc., 1963.

the rate of increase in stock prices exceeded the rate of increase in earnings which is opposite to the findings of Molodovsky and the Cowles Commission. It is quite possible that the different periods used in the three studies caused the conflicting results.

Relationship Between GNP and Stock Prices

Earlier it has been shown that there is a definite relationship between earnings and GNP on one hand, and earnings and stock prices on the other. Thus, if GNP influences earnings and earnings influence stock prices, theoretically it appears logical that GNP influences stock prices. It need not be disturbing to find an inter-correlation between GNP and earnings. For example, earnings in period X may influence GNP in period X + 1. The larger GNP in period X + 1 (which was influenced by earnings in period X) will also mean larger earnings in the period X + 1, and larger earnings will favorably influence stock prices. Thus, the existence of inter-correlation between earnings and GNP does not disturb the influence of GNP on stock prices.

The relationship between GNP and stock prices will be tested empirically by two methods. First, the correlation between GNP and stock prices will be computed by the use of statistical techniques. Second, a linear regression equation will be derived from the data for a long period of time,

taking GNP as the independent variable and stock prices as the dependent. If the results of the equation are reliable, it implies that stock prices are a function of GNP.

Using the data shown in Table 2 (page 30), the computed r = .847 for the period 1869 to 1958. The correlation is significant at the five percent level.

Using the same data for the period 1869 to 1958 and assuming a linear relationship[1] between GNP and stock prices, the values of the regression equation are 14.23 + .7488 GNP when GNP is expressed in number of billions of dollars. This means that stock prices measured in terms of Standard and Poor's Industrial Index should be equal to about seventy-five percent of the number of billions of dollars of GNP plus another 15 points. It is significant to note that the values of the equation were found to be almost the same when the annual figures of stock prices and GNP were used for the years 1909 to 1927 and 1933 to 1940. This indicates that the long-term relationship may be reliable for shorter periods also if (1) extraordinary periods like the 1929-33 depression are thrown out and (2) the periods are not shorter than a year.

In a study similar to the present paper, Ezra Solomon[2] has examined the relationship between the rate of growth of

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[1]The validity of the linear relationship between GNP and stock prices is shown in Chart 5, page 31.

[2]Ezra Solomon, "Economic Growth And Common Stock Values," Journal of Business, University of Chicago, July 1955, p. 213.

Table 2

Gross National Product and Standard & Poor's Industrial Index, by Decades, 1869-1955.

Decade	GNP (in billions)	Standard & Poor's Industrial Index (1935-39 = 100)
1869 - 1878	$ 7.1	18.5
1879 - 1888	10.7	20.2
1889 - 1898	12.7	23.8
1899 - 1908	21.7	33.0
1909 - 1918	40.1	47.0
1919 - 1928	81.2	77.0
1929 - 1938	78.3	95.7
1939 - 1948	179.3	105.6
1949 - 1958	323.1	207.4

Reproduced from J. F. Weston's article, "The Stock Market in Perspective," Harvard Business Review, March-April 1956, p. 76.

Figures for gross national product come from: First column, first 12 decades, Simon Kuznets, "Long-Term Changes in the National Income of the United States of America Since 1870," International Association for Research in Income and Wealth, Income and Wealth: Series 11, (Cambridge, England: Bowes and Bowes, Publishers, Ltd., 1952), p. 30; last 5 decades, Economic Report of the President, January 1955; second column, U. S. Department of Commerce, Historical Statistics of the United States and Survey of Current Business."[1]

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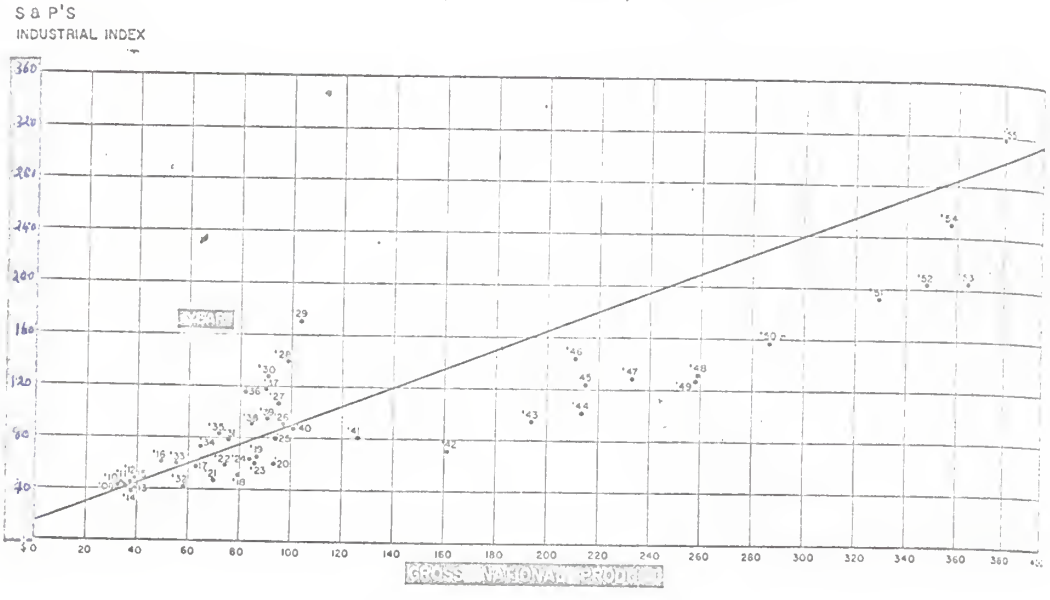
[1]Footnote 1: op.cit., p. 217.

Chart 5

EXHIBIT II. RELATIONSHIP BETWEEN STANDARD & POOR'S INDUSTRIAL INDEX (1935–1939 = 100) AND GROSS NATIONAL PRODUCT
(In billions of dollars)



Source: Weston, J. F. "The Stock-Market in Perspective" Harvard Business Review, March-April, 1956, p. 74.

GNP and the rate of growth of stock prices. He has shown that over a period of about eighty years (1874 to 1955) ". . . the real growth in stock values has proceeded at about two-thirds of the rate of real growth in gross national product."[1]

Tables 3 and 4 (on pages 33 and 34) have been taken from Mr. Solomon's study. Table 3 shows GNP and stock prices in current and constant prices and indicated rates of real growth in GNP for two periods. Indicated rate of growth is the average real growth in GNP in a particular period. Table 4 shows warranted stock prices and growth rates of stock prices for two different periods. Warranted stock prices have been computed in such a way as to result in a rate of growth in stock values equal to two-thirds of the rate of growth in GNP, when both stock values and GNP are in terms of constant dollars. The grouping of the years while computing indicated rates of real growth in GNP and the growth rates of stock prices has been on the basis of the rate of economic growth. Consecutive years with similar rates of growth have been put in the same category.

The results of Ezra Solomon's study supports the contention of this paper that business conditions have a strong influence on stock prices over a long period of time. The exact quantitative relationships of the two are not directly

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[1] Ibid., p. 217.

Table 3

Gross National Product in Current and Constant Prices

Period	(Annual rates in billions of dollars) Current prices	Price Index	In constant prices 1955	Indicated rates of real growth	Indicated trend of real growth
1874 - 1883	$ 9	$ 35.75	25.6		25.6
1879 - 1888	10.7	32.31	33.1		31.1
1884 - 1893	11.8	29.96	39.4		37.7
1889 - 1898	12.7	27.61	46.0	4 percent	45.9
1894 - 1903	15.9	28.20	56.4		55.9
1899 - 1908	21.7	31.14	69.7	per annum	68.0
1904 - 1913	28.6	34.08	83.9		82.7
1909 - 1913	32.2	35.80	89.9		89.9
1909 - 1913	35.8	35.80	100		100.0
1914 - 1918	55.6	46.41	119.8		115.9
1919 - 1923	85.1	63.59	133.8		134.4
1924	85.6	58.57	146.3		146.9
1925	90.3	60.08	150.3		151.3
1926	96.4	60.63	159.0		155.8
1927	94.9	59.46	159.6		160.5
1928	97.9	58.75	166.6	3 percent	165.3
1929	103.8	58.75	176.6		170.2
1930 - 1934	69.2	49.20	140.7	per annum	186.0
1935 - 1939	84.2	48.62	173.2		215.6
1940 - 1944	159.2	59.90	266.2		250.0
1945 - 1949	235.3	79.90	295.1		289.8
1950 - 1954	337.3	96.55	349.3		336.0
1955	369.0	100.00	369.0		367.1

Source: Ezra Solomon, "Economic Growth and Common Stock Values," University of Chicago, Journal of Business, July 1955, p. 216.

Table 4

Industrial Stock Prices: Standard and Poor's Index (1935-39 = 100) converted to constant 1955 dollars.

Period	Actual	Warranted	Growth rates
1874 - 1883	$ 56.3	$ 56.3	
1879 - 1888	65.6	64.2	
1884 - 1893	82.8	73.3	2.667 percent
1889 - 1898	90.2	83.6	
1894 - 1903	98.9	95.4	per annum
1899 - 1908	111.0	108.8	
1904 - 1913	118.7	124.1	
1909 - 1913	125.9	130.8	
1914 - 1918	129.7	144.4	
1919 - 1923	95.6	159.4	
1924	107.5	169.2	
1925	132.8	172.6	
1926	148.9	176.0	
1927	179.9	179.5	2 percent
1928	237.0	183.1	
1929	291.1	186.8	per annum
1930 - 1934	152.6	198.2	
1935 - 1939	205.5	218.8	
1940 - 1944	149.0	241.6	
1945 - 1949	164.9	266.7	
1950 - 1954	208.2	294.5	
1955	308.3	312.5	

Source: Ezra Solomon, "Economic Growth and Common Stock Values," Journal of Business, University of Chicago, July 1955, p. 217.

comparable, however, because (1) the periods used are different and (2) Solomon's computation relates the rates of growth in GNP and stock prices whereas the regression equation shown above indicates the effect of a change in GNP on stock prices.

Examination of the Reliability of the Predictive Value of the Equation

The examination of the reliability of the predictive value of the equation can be conducted only on an expost basis. The period selected for this purpose is 1926 to 1955. This period is split into three groups on the basis of over and undervaluation of stocks.[1] The regression line in Chart 5, page 31, shows the stock prices associated with various levels of GNP that have been computed from the regression equation.

It may be noted that the test of the equation makes use of yearly figures of stock prices and GNP while the equation was derived from ten-year averages of these variables. The purpose of the test is to determine (1) the extent to which prices of the stocks computed on the basis of the equation differ from the actual prices and (2) whether or not some logical explanation can be found when differences occur.

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[1] In this paper, stocks are referred to as undervalued when the actual stock prices fall below the regression line. This means that actual stock prices are not as high as they should have been on the basis of present earnings. Overvaluation of stocks means that stock prices are above what they should have been based on earnings.

In cases of a deviation of the computed prices from the actual prices, the test may show that there is a tendency of the actual prices to approximate again the computed prices when the factors that were temporarily strong enough to cause the deviation lose their force. Many extraneous factors affect stock prices temporarily, but their influence wears out in the long run. As their influence vanishes, there is a tendency for stock prices to be regulated again primarily by earnings.

In the present paper earnings alone have been considered as the permanent causal factor. Confidence and optimism that are so important in the determination of stock prices are based largely on earnings in the long run. The prospects of better earnings create optimism.[1]

It might be noted that the explanations given for the deviations of the computed prices from the actual prices do not constitute an absolute proof. Yet these explanations appear plausible enough in the light of the past events to be considered as reasonable and logical.

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[1]There are several factors that influence stock prices temporarily but their influence wears out in the long run. For the present paper, such factors have not been considered because the purpose of this paper is to show the relationship of stock prices with those factors that have long run influence on stock prices.

Period 1926 to 1929

Chart 5 shows that the computed stock price in the year 1926 was on the regression line but beginning with 1927 stocks were overvalued. The overvaluation of stocks continued until 1929 when the great crash took place. The unprecedented rise in stock prices and their overvaluation may be explained through the following facts:

Increase in Earnings. The following table shows that GNP and earnings increased during this period which probably helped build up confidence and optimism in the stock market.

Year	Description of Year	GNP	Corporate Profits
1925	Upswing	81.8	Figures
1926	Prosperity with slight recession in second half	86.4	are not
1927	Slight recovery, then recession	85.8	available
1928	Upswing	90.2	98.2
1929	Boom and collapse	93.6	104.4

The increase in earnings and GNP has been substantial during this period (i.e. from 1926 to 1929) which might have created an anticipation of better earnings and GNP. This in turn possibly built up confidence and optimism in the stock market that contributed to the rapid increase in the stock prices. The increase in stock prices was faster than the increase in earnings and GNP. Apparently other factors also temporarily helped this boom.

> Thus viewed, the stock market is but a mirror which, perhaps as in this instance, somewhat belatedly, provides an image of the underlying or fundamental economic situation. Cause and effect run from the economy to the stock market, never the reverse.[1]

Once the fact was realized in late 1929 that stock prices were not in line with earnings, direction of movement of prices was reversed. The rate of fall of stock prices then was determined by various factors operating in the market. The realization of the fact that stock prices were out of line with earnings took time because this had to be realized by the market as a whole whose psychology no one could predict with precision.

Faulty Monetary Policy. The failure of the Federal Reserve Board to pursue a correct credit and monetary policy was monumental during this period. J. K. Galbraith observes:

> The Federal Reserve Board in those times was a body of startling incompetence.[2]

> Early in the twenties the volume of broker's loans--because of their liquidity they are often referred to as call loans or loans in the call market--varied from a billion to a billion and a half dollars. By early 1926 they had increased to two and a half billions and remained at about that level for most of the year. During 1927 there was another increase of about a billion dollars, and at the end of the year they reached 3,480,780,000. This was an incredible sum, but it was only the beginning. In the two dull winter months of 1928 there was a small decline and then expansion began in earnest. Broker's loan reached

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[1] J. K. Galbraith, The Great Crash, 1929, p. 93.

[2] J. K. Galbraith, op. cit., p. 32.

> four billion on the first of June 1928, five billion on the first of November, and by the end of the year they were well along to six billion. Never had there been anything like it before.[1] (See Chart 6A, page 40.)

In the spring of 1928, Montagu Norman, Governor of the Bank of England, Hjalmar Sehacht, Governor of the Reichbank and Charles Rist, the Deputy Governor of the Bank of France came to the United States (because of monetary trouble at home) to urge for an easy money policy in the United States. The Federal Reserve Board complied with the request and cut the rediscount rate from 4 percent to 3.5 percent. This made money easily available in a speculative market, which helped to worsen the situation. When the Reserve Board realized the gravity of the situation it could not do anything under the pressure of business community and conservative political elements that had come into power. Not until August 1929 did the Board increase the rediscount rate to six percent. The impact of this action was nullified because of a simultaneous easing of the buying rates on acceptances.

Poor Knowledge of Economics. Unfortunately, during this period, economists in general were in error on major economic issues. Professor Irving Fisher commented: "Stock prices have reached what looks like a permanently high plateau."[2]

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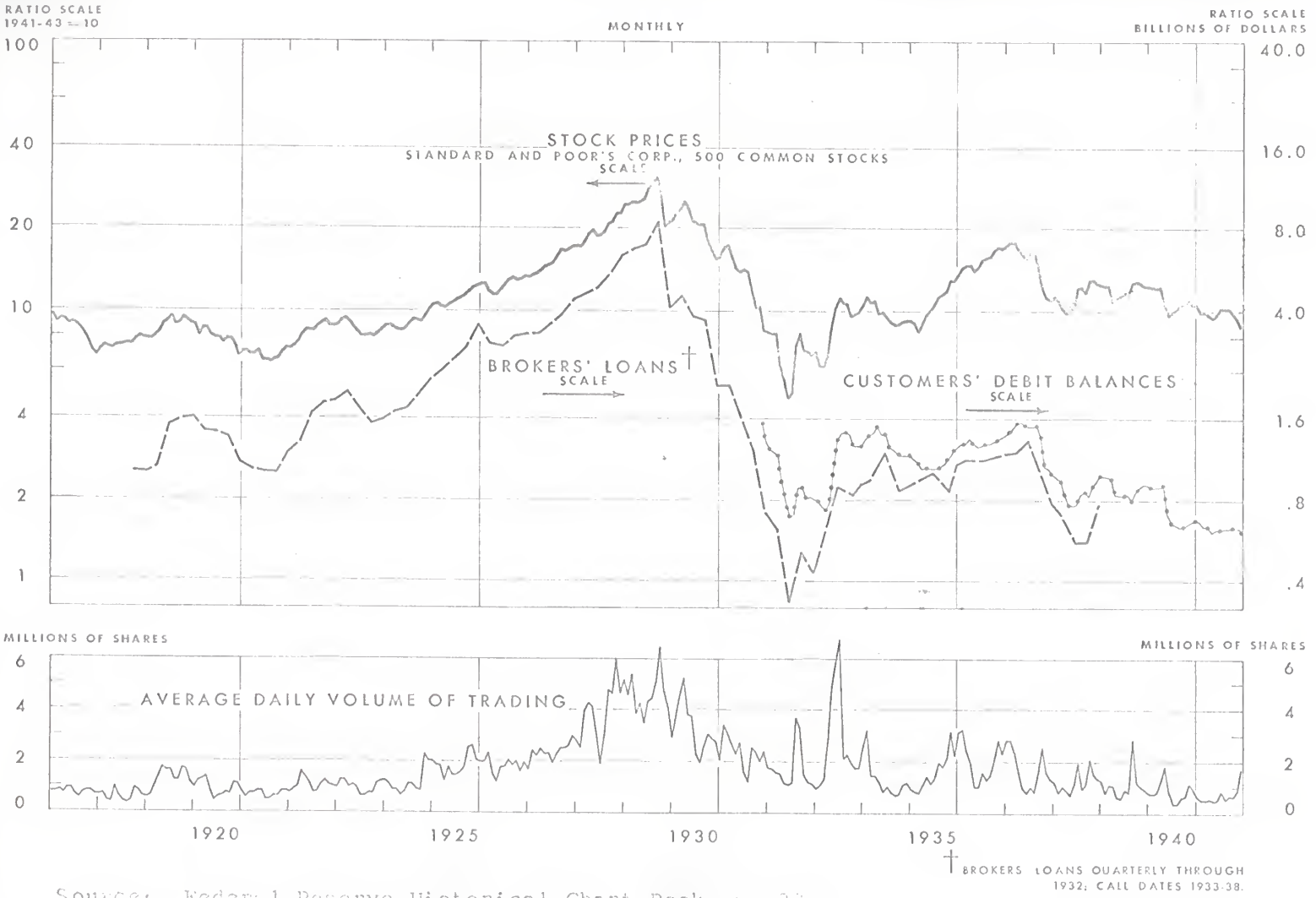
[1] J. K. Galbraith, op. cit., p. 26.

[2] Quoted from J. K. Galbraith, "Wall Street and Washington," The Great Crash, 1929, p. 75.

Chart 6A

STOCK MARKET



Source: Federal Reserve Historical Chart Book, p. 32.

In November 1929 the Harvard Economic Society predicted "a severe depression like that of 1920-21 is outside the range of probability. We are not facing protracted liquidation." Lawrence of Princeton wrote:

> The consensus of judgement of the millions whose valuations function on that admirable market, the Stock Exchange, is that stocks are not at present over valued . . . Where is that group of men with all-embracing wisdom which will entitle them to veto the judgement of this intelligent multitude?[1]

The poor knowledge of economics is evident when national policies based on a balanced budget (which meant at that time higher taxes and reduced federal spending), misplaced fear of inflation, absence of low interest rates and plentiful credit are witnessed in the wake of a depression.

Public officials, bankers and politicians also played a part in building up confidence in the stock market. In June 1929, the official optimist Bernard Barauch said publicly "the economic condition of the world seems on the verge of a great forward movement."[2] Andrew W. Mellon (a cabinet member) said "There is no cause for worry. The high tide of prosperity will continue."[3] Most magazines and newspapers in 1929 reported the upward sweep of the market with admiration and awe and without alarm.

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[1] Ibid.

[2] J. K. Galbraith, American Magazine, June 1929, p. 75.

[3] J. K. Galbraith, op. cit., p. 20.

J. K. Galbraith observes, "The fact was that American enterprise in the twenties had opened its hospitable arms to an exceptional number of promoters, grafters, swindlers, impostures and frauds."[1] Examples of Ivar Kreuger, John J. Raskobe and many others can be cited.

One of the most outstanding developments of the time that gave a big push to stock prices was Mr. John Raskobe's idea of investment and trust. During 1928, approximately 186 investment trusts were organized whose purpose was to collect money from the public (especially from small investors who, in general, did not have enough knowledge about particular stocks in which money could be invested most profitably) and invest it in stocks. By the beginning of 1929, they were promoted at the rate of one a day; a total of 265 were formed during the year. The trusts sold about $400,000,000 worth of their securities to the public in 1927, and in 1929 an additional of $3,000,000,000. By the autumn of 1929, the total assets of the investment trusts were estimated to exceed $8,000,000,000. The huge resources of trusts were used to buy stocks. This was an important reason why the stock prices were pushed so high.

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[1] J. K. Galbraith, op. cit., p. 49.

The 1930-1941 Period

After the crash in 1929, stock prices started falling rapidly, and the fall continued until 1932. The share price index fell from 189.4 in 1929 to 140.6 in 1930, to 87.4 in 1931 and to 46.5 in 1932. Stocks were still overvalued compared to regression line in 1930 and 1931 because (1) prices in 1929 had shot up so high that it took some time before they fell enough to be in line with earnings and (2) earnings and GNP themselves were falling rapidly. In terms of constant 1929 prices, GNP fell from $94 billion in 1929 to $58 billion in 1932.

In 1932 stock prices had fallen enough to be very close to the regression line and they subsequently increased parallel to the increase in earnings and GNP. From 1931 to 1941 (as the observations on Chart 5 indicate) stock prices remained remarkably close to the regression line. Thus in the decade 1931 to 1941 computed prices are very close to the actual prices. Complete equality between computed prices and actual prices was not possible because (1) temporarily, many factors are able to influence stock prices and (2) the computed prices are on the basis of a long-term relationship while the actual prices are average annual figures.

The 1942-1955 Period

During the period 1942-1955, actual stock prices were considerably lower than computed stock prices. In 1953,

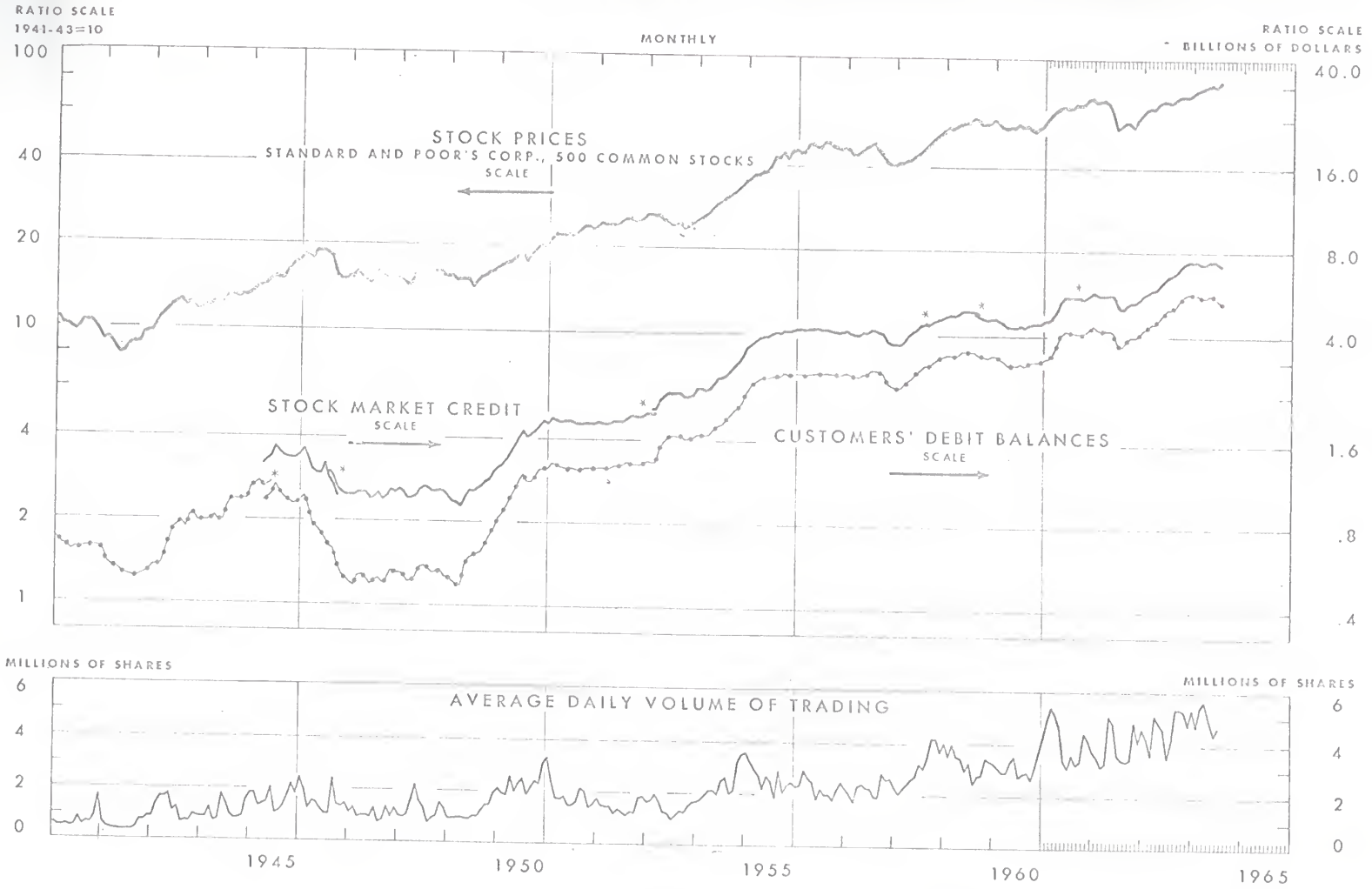
actual prices showed a tendency to catch up (see Chart 6B, page 45) and by 1955 they had come close to computed prices.

There was a sharp increase in GNP from 111 billion in 1938 to $183.6 billion in 1944 (see Charts 7A and 7B, pages 46 and 47 respectively) and after an interval of four years there was another increase from $171.1 billion in 1949 to $230.8 billion in 1955. Corporate earnings and dividends, the money supply and the general price level also increased in this period (see Table 1 and Charts 8 and 9, pages 18, 48, and 49). But the stock market did not respond immediately. Thus, stock prices, though rising, lagged behind the levels achieved by the rest of the economy. Several possible reasons can be cited for this laggerdly behavior of stock prices.

The Second World War boosted GNP during the early forties, but that was only a temporary factor. For a capitalistic economy like that of the United States, there was no ready solution to the problem of maintaining the economy at high level of activity. In the first place, there was no unanimity of opinion (which has not been achieved even today) among the economists themselves about the answer to the question of how to maintain a high level of business activity. Secondly, even if they had an answer, what credibility could have been given to it after taking into account their performance in the thirties. Thirdly, what guarantee was there that the politicians would accept

Chart 6B

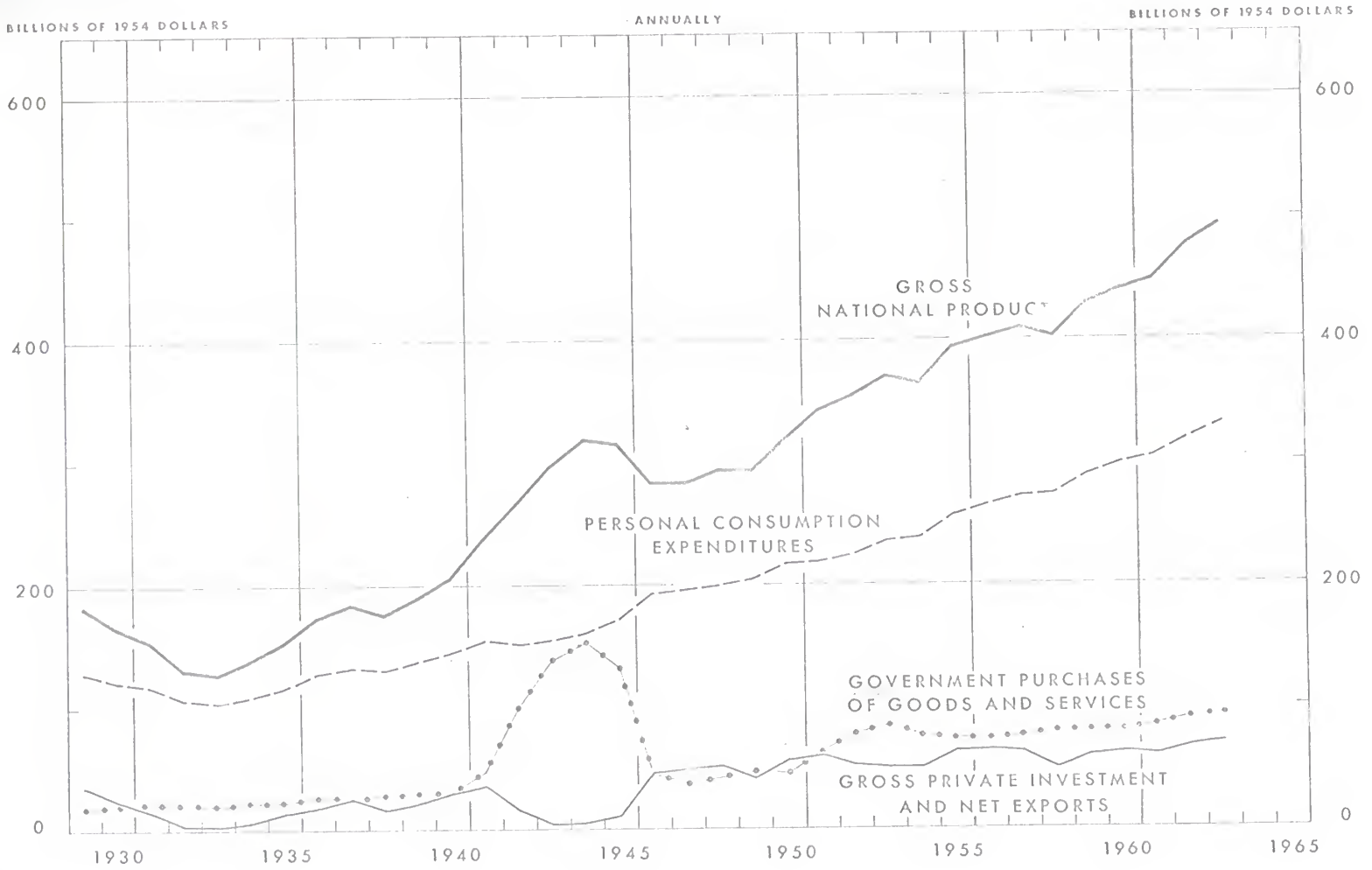
STOCK MARKET – Cont.



Source: Federal Reserve Historical Chart Book, p. 33.

Chart 7A

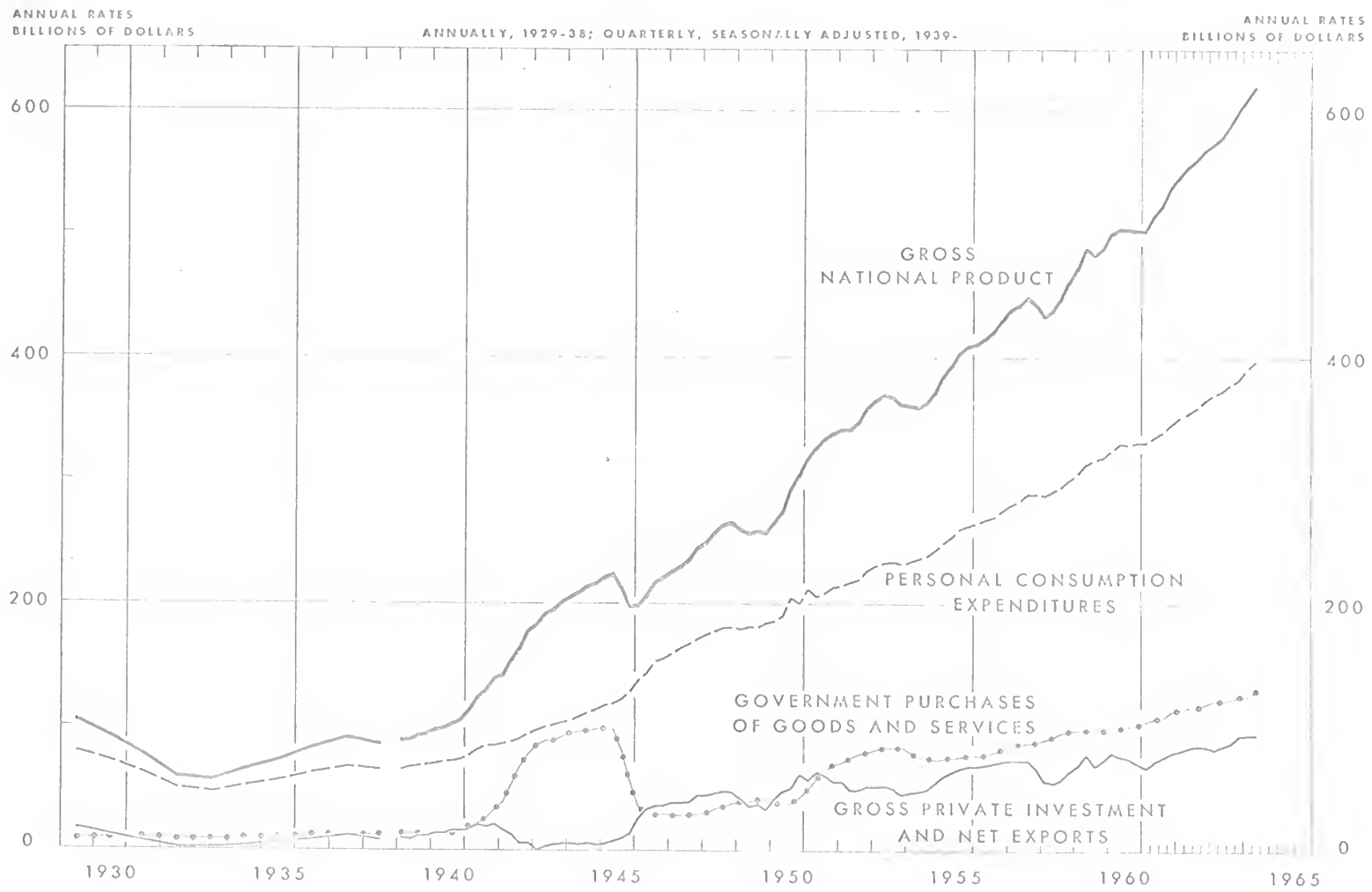
GROSS NATIONAL PRODUCT IN CONSTANT DOLLARS



Source: Federal Reserve Historical Chart Book, p. 72.

Chart 7B

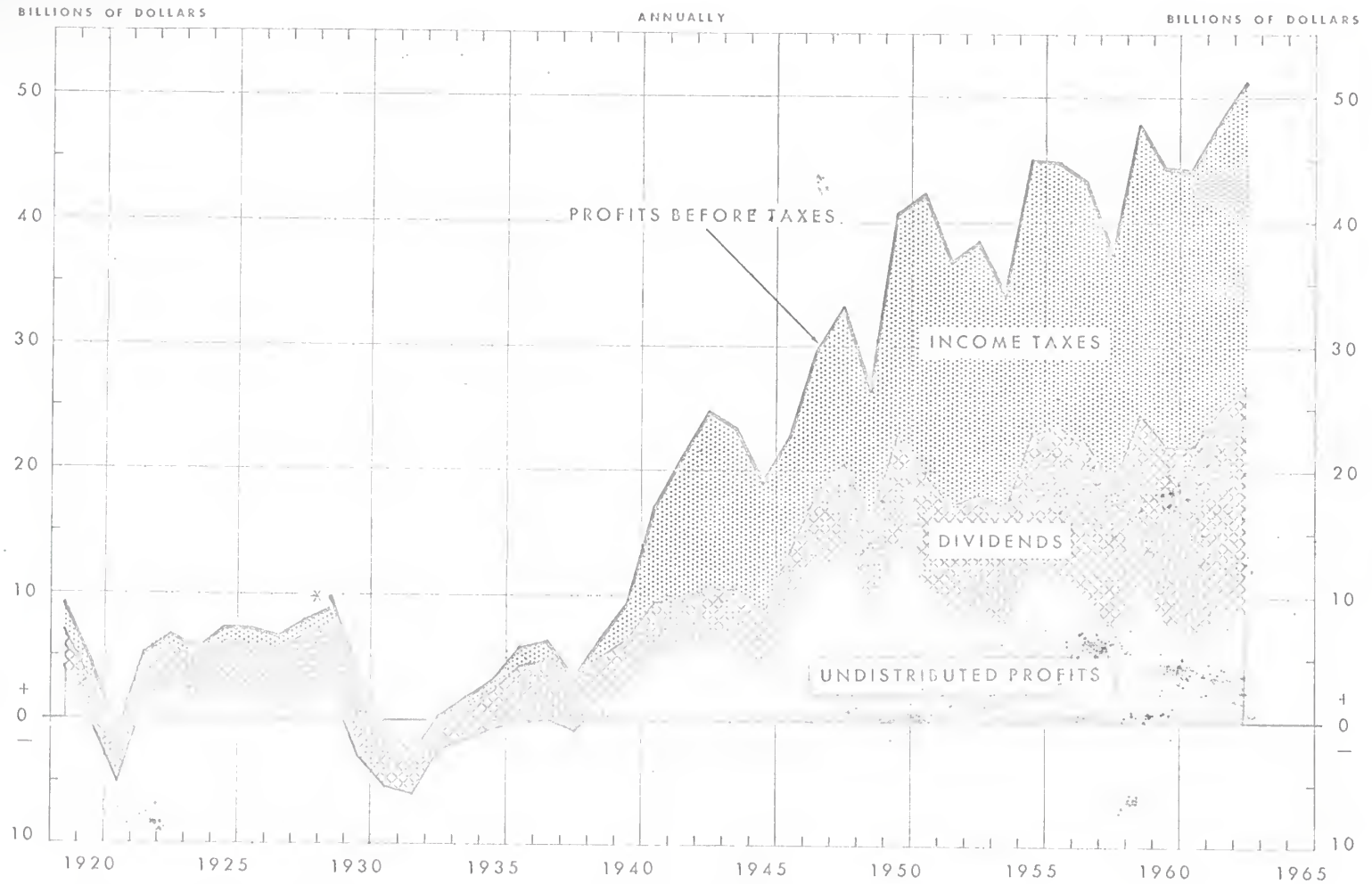
GROSS NATIONAL PRODUCT



Source: Federal Reserve Historical Chart Book, p. 73.

Chart 6

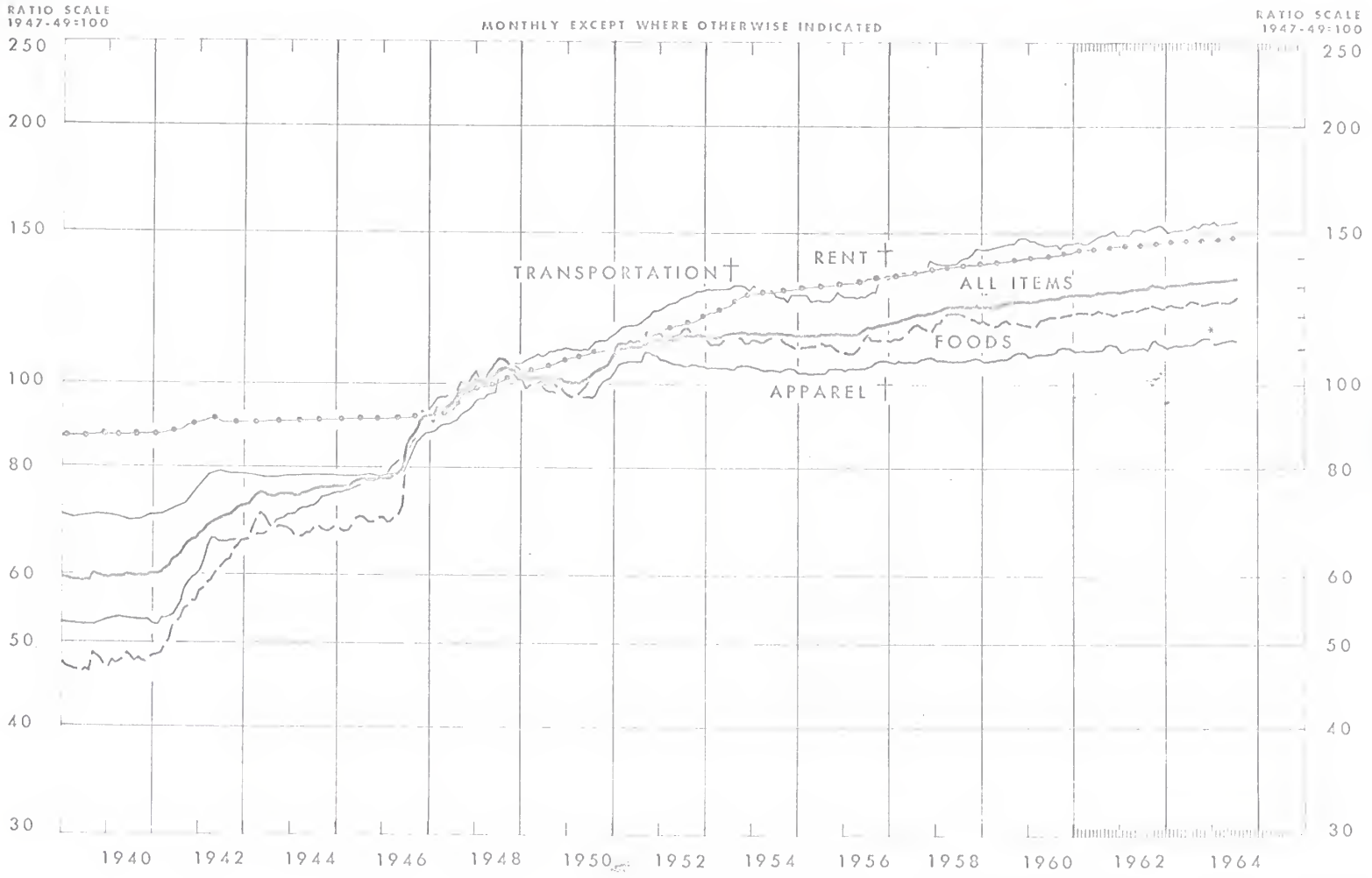
CORPORATE PROFITS, TAXES, AND DIVIDENDS



Source: Federal Reserve Historical Chart Book, p. 60.

Chart 9

CONSUMER PRICES – Cont.



Source: Federal Reserve Historical Chart Book, p. 97.

the answer of the economists, assuming economists had the right answers to the problems. (Even today, the propriety of the national debt and budget deficits are questioned.) There was every reason to be skeptical about the permanence of the economic boom of the war period. An important question for the United States today is how to support the economy if a complete disarmament is accepted and defense expenditures of $55 billions are reduced to a meagre figure of a few billions. This apprehension is fully supported in the light of the developments that have taken place after the war. Immediately after the tempo of expenditures slowed, towards the end of the war, the economy slipped backward. From $183.6 billion in 1944, GNP dropped to $180.9 billion in 1945 despite the fact that the war continued until about the middle of 1945. The full impact of the end of the war on the economy was realized in 1946 when GNP declined sharply to $166.8 billion. Immediately after 1946, experts on this matter forecasted stagnation and depression. Depression succeeds boom was an almost unchallengible dogma at that time. The end of the war, the low level of the economy (not until 1950 did GNP attain the level of 1944) and the economists' prophecy of an impending depression may explain the low stock prices that prevailed until the second half of 1949.

Economists made remarkable progress during the period 1932 to 1950. Keynsian economics was not only a revolution in economic theory but in its practical effectiveness as well.

After Roosevelt was elected to the presidency, principal tenets of Keynsian economics were applied to solve economic problems. The results were highly encouraging.

By 1950, Keynsian economics had been further extended and tested. The effectiveness of national economic policies was tested in the 1945-1950 downturn and its immediate recovery. The outbreak of the Korean War during the early phase of the recovery tended to cast some doubt on economists' ability to make the economy resume and sustain a high level of growth on its own. Many persons legitimately doubted if the quick recovery from recession was because of the effectiveness of the economic policies to avert the depression or because the outbreak of hostilities required higher expenditure for defense purposes. The effects of larger war expenditures were intermingled with the effects of the economic policies which had been adopted to avert depression.

The old question of "what after war?" still remained unanswered and people were skeptical about the permanence of economic growth. Although economists in general did not predict a depression after 1950 as they did before 1949, people did not find conclusive evidence of the effectiveness of the application of economic theory in averting a depression. The possibility of a depression and people's attitude concerning economists' ability to avert it in 1950, 1951, and 1952 was similar to the situation immediately after the Second

World War. Despite the fact that GNP increased from $187.1 billion to $206.7 billion in 1952, stock prices did not increase proportionately (see Chart 6B).

The long awaited test came during the 1953-54 recession. The effectiveness of national economic policies against the recession indicate economists' ability to handle such situations. Possibly this helped to build optimism and confidence in the economy and the stock market. Stock prices rose rapidly and came close to the computed prices. (Actual prices came quite close to the computed prices in 1954). In 1955, this trend continued.

The following facts are important in explaining the rapid increase in stock prices and their returning to approximately computed prices. They helped build confidence and optimism in the stock market which pushed their prices high enough to be in line with earnings.

1. The effective control of the 1953-54 recession was an important factor, especially when viewed against the widely held opinion in early 1954 that the long awaited test had come.
2. The revision of internal revenue code and the tax relief given to corporations and to dividend recipients was unquestionably important in continuing the growth of the economy.
3. The revival of monetary policy as a prime instrument of control and the very sharp fall in

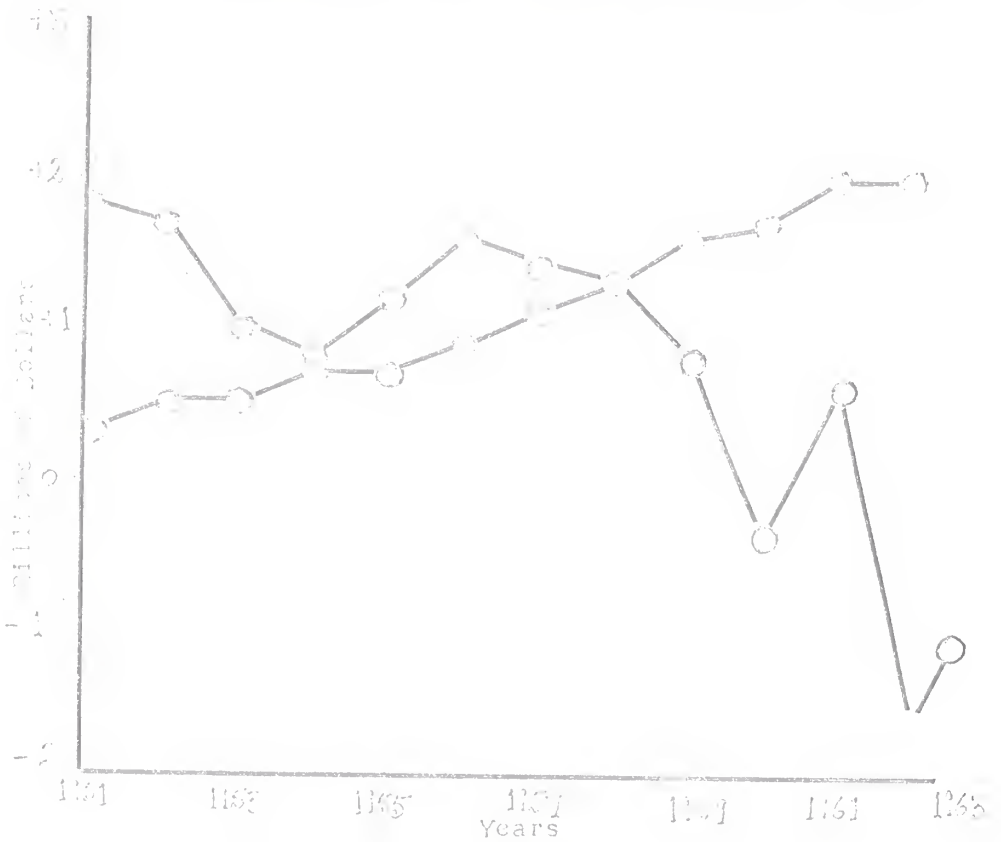
long-term interest rates in 1953-54 that it brought were also demand-creating factors in the stock market.

4. The Employment Act of 1946 gave the President more power to interfere in the economic affairs of the country. Fiscal and monetary policies can now be resorted to more easily.
5. The probable upward shift of the consumption function in the United States might be another stabilizing factor in the economy. This was true particularly after the Second World War when the demand for goods and services which had been restrained during the war period was allowed to be satisfied. This might have helped revive the economy from a low level of economic activity during 1946.

The optimism and confidence in the growth of the economy and stock prices is reflected in the institutional changes in a stock market since 1950. Chart 10 (page 54) shows the flight of individual investors away from and the movement of pension funds into the stock market; the latter more than compensating for the loss caused by the exit of individuals. Since 1950, the movement of pension funds into the stock market and of individuals out of it has been increasing. The outward movement of individuals does not indicate a lack of faith in the stock market, although the inward movement

Chart 10

The Institutional Bulls and the Individual Bears



Source: Seligman, Daniel and Wise, T. A. "How Forces in Stock Market," Fortune, Feb. 1964, p. 93.

by pension funds does indicate more faith. The reason for this is that individuals got out because (1) they were able to get a high return (as much as 5 percent) in savings deposits with banks and (2) the pattern of their needs is such that stocks were not suited to them as a means of investment because most low income individuals cannot make long-term investments and short-term investments in stocks are too risky. Various studies have shown that the flight of the individuals in income brackets under $10,000 a year from the stock market has been overwhelmingly large in comparison to the individuals in the income brackets above $20,000. For example, a Fortune study showed ". . . a steady and deep decline in the proportion of investors with income under $10,000 -- a decline much too steep to be accounted for by inflation and generally rising income level of Americans."[1] It should be noted that big investors have not left the stock market.

For obvious reasons, the movement of non-insured pension funds into the market is an indication of more faith in the growth of the economy and stock market by financial institutions whose judgement of economic situations is more reliable than that of a layman.

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[1]Daniel Seligman and T. A. Wise, Fortune, February 1964, p. 95.

SUMMARY AND CONCLUSIONS

The following are the conclusions of the study:

First, business conditions and stock prices are very closely related. Business conditions determine earnings and earnings determine stock prices. Earnings influence stock prices through both dividends and retained earnings.

Second, the above relationship is much closer over the long run. In the short run, it may not hold. The regression equation derived from the ten-year averages of GNP and Standard and Poor's Long-Term Industrial Stock Price Index did not always predict accurately the actual yearly stock prices.

Third, many factors influence stock prices temporarily and they may appear more important in influencing stock prices than business conditions. However, these factors lose their force in the long run and stock prices are again regulated by business conditions. In the expost test of the regression equation, extraordinary developments were suggested as possible causes of the deviations of actual prices from the regression line.

Fourth, on a priori basis, business conditions were assumed to be the cause and stock prices the effect over the long run. Emperical evidence supports the validity of this assumption. There is some possibility of a feedback but it appears to be too small to be discernible.

The study has some practical implications for investors. It supports the idea that, in a growing economy, investment in stocks in general can be profitable in the long run despite temporary fluctuations in stock prices.

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APPENDIX

Appendix Table 1

Reference Dates and Durations of Business Cycles in the United States

Monthly reference dates		Duration in months			Quarterly reference dates		Calendar-year reference dates		Fiscal-year reference dates	
Peak	Trough	Expansion	Contraction	Full cycle	Peak	Trough	Peak	Trough	Peak	Trough
...	...	..	..	..	...	...	...	1834	...	...
...	...	..	..	..	...	...	1836	1838	...	...
...	...	..	..	..	...	...	1839	1843	...	...
...	...	..	..	..	...	...	1845	1846	...	...
...	...	..	..	..	...	...	1847	1848	...	...
...	Dec. 1854	..	..	..	...	4Q 1854	1853	1855	...	...
June 1857	Dec. 1858	30	18	48	2Q 1857	4Q 1858	1856	1858	...	...
Oct. 1860	June 1861	22	8	30	3Q 1860	3Q 1861	1860	1861	...	...
Apr. 1865	Dec. 1867	46	32	78	1Q 1865	1Q 1868	1864	1867	...	1868
June 1869	Dec. 1870	18	18	36	2Q 1869	4Q 1870	1869	1870	1869	1871
Oct. 1873	Mar. 1879	34	65	99	3Q 1873	1Q 1879	1873	1878	1873	1878
Mar. 1882	May 1885	36	38	74	1Q 1882	2Q 1885	1882	1885	1882	1885
Mar. 1887	Apr. 1888	22	13	35	2Q 1887	1Q 1888	1887	1888	1887	1888
July 1890	May 1891	27	10	37	3Q 1890	2Q 1891	1890	1891	1890	1891
Jan. 1893	June 1894	20	17	37	1Q 1893	2Q 1894	1892	1894	1893	1894
Dec. 1895	June 1897	18	18	36	4Q 1895	2Q 1897	1895	1896	1896	1897
June 1899	Dec. 1900	24	18	42	3Q 1899	4Q 1900	1899	1900	1900	1901
Sep. 1902	Aug. 1904	21	23	44	4Q 1902	3Q 1904	1903	1904	1903	1904
May 1907	June 1908	33	13	46	2Q 1907	2Q 1908	1907	1908	1907	1908
Jan. 1910	Jan. 1912	19	24	43	1Q 1910	4Q 1911	1910	1911	1910	1911
Jan. 1913	Dec. 1914	12	23	35	1Q 1913	4Q 1914	1913	1914	1913	1915
Aug. 1918	Apr. 1919	44	8	52	3Q 1918	2Q 1919	1918	1919	1918	1919
Jan. 1920	Sep. 1921	9	20	29	1Q 1920	3Q 1921	1920	1921	1920	1922
May 1923	July 1924	20	14	34	2Q 1923	3Q 1924	1923	1924	1923	1924
Oct. 1926	Dec. 1927	27	14	41	3Q 1926	4Q 1927	1926	1927	1927	1928
June 1929	Mar. 1933	18	45	63	2Q 1929	1Q 1933	1929	1932	1929	1933
May 1937	May 1938	50	12	62	2Q 1937	2Q 1938	1937	1938	1937	1939

Source: Burns, Arther F. and Mitchell, Wesley C. Measuring Business Cycles. New York: National Bureau of Economic Research, Inc., 1947.

Appendix Table 2

Duration and Amplitude of Common-stock Price Cycles, 1871-1948*

Dates of cycles	Duration, months	Index of cycle limits			Amplitude		
		Initial trough	Peak	Terminal trough	Rise	Decline	Total cycle
Jan., 1871 - Apr., 1872 - June, 1877	77	99.2	114.1	63.3	14.9	50.8	65.7
June, 1877 - June, 1881 - Jan., 1885	91	58.2	132.3	88.0	74.1	44.3	118.4
Jan., 1885 - May, 1887 - June, 1888	41	83.3	116.7	98.6	29.0	13.7	42.7
June, 1888 - May, 1890 - Dec., 1890	30	96.4	104.5	88.9	8.1	15.6	23.7
Dec., 1890 - Aug., 1892 - Aug., 1893	32	90.6	106.9	80.8	16.3	26.1	42.4
Aug., 1893 - Sept., 1895 - Aug., 1896	36	95.1	104.9	89.4	13.0	18.7	31.7
Aug., 1896 - Apr., 1899 - Sept., 1900	49	76.4	122.9	114.3	46.5	8.6	55.1
Sept., 1900 - Sept., 1902 - Oct., 1903	37	76.0	112.3	81.4	36.3	30.9	67.2
Oct., 1903 - Sept., 1906 - Nov., 1907	49	75.9	118.8	77.8	42.9	41.0	83.9
Nov., 1906 - Dec., 1909 - July, 1910	32	73.5	115.7	100.5	42.2	15.2	57.4
July, 1910 - Sept., 1912 - Dec., 1914	53	100.1	110.2	83.5	10.1	26.7	36.8
Dec., 1914 - Nov., 1916 - Dec., 1917	36	84.1	114.5	80.3	30.4	34.2	64.6
Dec., 1917 - July, 1919 - Aug., 1921	44	89.1	116.9	83.0	27.8	33.9	61.7
Aug., 1921 - Mar., 1923 - Oct., 1923	26	82.5	117.1	103.0	34.6	14.1	48.7
Oct., 1923 - Sept., 1929 - June, 1932	104	56.8	185.9	31.6	129.1	154.3	283.4
June, 1932 - Mar., 1937 - Apr., 1938	70	43.9	152.2	88.6	108.3	63.6	171.9
Apr., 1938 - Oct., 1939 - May, 1942	49	90.2	115.5	74.3	25.3	41.2	66.5
May, 1942 - May, 1946 - Feb., 1948	69	58.2	138.6	105.9	80.4	32.7	113.1

*Based on Standard & Poor's Composite Long-term Stock Price Index.

Source: Cottle, Charles S. and Whitman, W. T. Investment Timing: The Formula Plan Approach. New York: McGraw-Hill Book Company, Inc., 1953.

THE RELATIONSHIP BETWEEN STOCK PRICES AND BUSINESS CONDITIONS

by

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The report examines the relationship between business conditions and stock prices, both theoretically and empirically on a long term basis. It attempts to answer the following questions:

1. Do business conditions affect stock prices over the long run?
2. If the answer to question one is in the affirmative, what is the nature of this effect?

Theoretically, the relationship between business conditions and stock prices is established through earnings. An attempt is made to show that business conditions affect earnings and earnings affect stock prices. Thus, business conditions indirectly affect stock prices. The theoretically established relationship has been tested empirically.

Operationally defining business conditions as Gross National Product, the correlation is computed between ten-year averages of GNP and ten-year averages of Standard and Poor's Long-Term Industrial Index for the period 1869 to 1955. The correlation computations result in an r of + .8872 which is significant at five percent level.

A linear regression equation is computed from the ten-year averages of GNP and Standard and Poor's Long-Term Industrial Index for the same period of time with stock prices as the dependent variable. The reliability of the predictive power of the equation is tested on an expost basis for the period of 1926-1955. The regression equation

is found to be a good expression of the relationship between average annual stock prices and average annual GNP for the period. In cases where there are differences between computed stock prices and actual stock prices, extraordinary developments are suggested as the probable causal factors that temporarily pushed actual stock prices away from computed ones.

The findings of the study support the thesis that business conditions through earnings determine stock prices, over the long run.